PERGAMON

Computers and Chemical Engineering 24 (2000) 2771–2788

Computers & Chemical Engineering

www.elsevier.com/locate/compchemeng

LIST OF CONTENTS

NUMBER 1

M. Hanke and P. Li — 1 — Simulated annealing for the optimization of batch distillation processes

N. Kapoor and P. Daoutidis — 9 — Stabilization of nonlinear processes with input constraints

V. Shyamsundar and G.P. Rangaiah — 23 — A method for simulation and optimization of multiphase distillation

A.M. Cervantes, A. Wächter, R.H. Tütüncü and L.T. Biegler — 39 — A reduced space interior point strategy for optimization of differential algebraic systems

L. Estel, F. Bagui, M.A. Abdelghani-Idrissi and C. Thenard — 53 — Distributed state estimation of a counter current heat exchanger under varying flow rate

W. Zhao, D. Chen and S. Hu — 61 — Optimizing operating conditions based on ANN and modified GAs

K. Edwards, T.F. Edgar and V.I. Manousiouthakis — 67 — Reaction mechanism simplification using mixed-integer nonlinear programming

J. Tanskanen and V.J. Pohjola — 81 — A robust method for predicting state profiles in a reactive distillation

M. von Schwerin, O. Deutschmann and V. Schulz — 89 — Process optimization of reactives systems by partially reduced SQP methods

R.B. McLain and M.A. Henson — 99 — Principal component analysis for nonlinear model reference adaptive control

B. Roffel, B.H.L. Betlem and J.A.F. de Ruijter — 111 — First principles dynamic modeling and multivariable control of a cryogenic distillation process

A. Kovač Kralj, P. Glavič and Z. Kravanja — 125 — Retrofit of complex and energy intensive processes II: stepwise simultaneous superstructural approach

J.G. Khinast and D. Luss — 139 — Efficient bifurcation analysis of periodically-forced distributed parameter systems

Short note

A.L.H. Costa, J.L. de Medeiros and F.L.P. Pessoa — 153 — Optimization of pressure relief header networks: a linear programming formulation

NUMBERS 2–7

Proceedings of the 7th International Symposium on Process Systems Engineering

R. McMeekin	161	Manufacturing and the internet — we haven't seen anything yet!
D.E. Shobrys and D.C. White	163	Planning, scheduling and control systems: why can they not work together
M. Kano, K. Nagao, S. Hasebe, I. Hashimoto, H. Ohno, R. Strauss and B. Bakshi	175	Comparison of statistical process monitoring methods: application to the Eastman challenge problem
E.N. Pistikopoulos, V. Dua, N.A. Bozinis, A. Bemporad and M. Morari	183	On-line optimization via off-line parametric optimization tools
E.S. Fraga, J. Hagemann, A. Estrada-Villagrana and I.D.L. Bogle	189	Incorporation of dynamic behaviour in an automated process synthesis system
Z.N. Pintarič and Z. Kravanja	195	The two-level strategy for MINLP synthesis of process flowsheets under uncertainty
E.N. Pistikopoulos, C.G. Vassiliadis and L.G. Papageorgiou	203	Process design for maintainability: an optimization approach
C.S. Bildea, A.C. Dimian and P.D. Iedema	209	Nonlinear behavior of reactor–separator–recycle systems
K. Hua, Y. Li, S. Hu and J. Shen	217	Three-distribution-parameter general model for reactor network synthesis
W.C. Rooney, B.P. Hausberger, L.T. Biegler and D. Glasser	225	Convex attainable region projections for reactor network synthesis
S. Kauchali, C. McGregor and D. Hildebrandt	231	Binary distillation re-visited using the attainable region theory
M. Nakaiwa, K. Huang, K. Naito, A. Endo, M. Owa, T. Akiya, T. Nakane and T. Takamatsu	239	A new configuration of ideal heat integrated distillation columns (HIDiC)
B.-G. Rong, A. Kraslawski and L. Nyström	247	The synthesis of thermally coupled distillation flowsheets for separations of five-component mixtures
E. Bek-Pedersen, R. Gani and O. Levaux	253	Determination of optimal energy efficient separation schemes based on driving forces
V. Bansal, J.D. Perkins, E.N. Pistikopoulos, R. Ross and J.M.G. van Schijndel	261	Simultaneous design and control optimisation under uncertainty
J.L. Contreras-Dordelly and T.E. Marlin	267	Control design for increased profit
H. Li, P.L. Lee, P. Bahri and I.T. Cameron	273	Decentralized control design for nonlinear plants: a ν-metric approach
A. Rehm and F. Allgöwer	279	Self-scheduled H_∞ output feedback control of descriptor systems
D. Leung and J. Romagnoli	285	Real-time MPC supervisory system

B. Lennox, H.G. Hiden, G.A. Montague, G. Kornfeld and P.R. Goulding	291	Application of multivariate statistical process control to batch operations
A. Chavoya, A. Sanchez and K. Lano	297	Formal implementation of procedural controllers for event-driven sequential systems in chemical processes
K. Fujino, K. Imafuku, Y. Yamashita and H. Nishitani	303	Design and verification of the SFC program for sequential Control
K.S. Lee, Y. Eom, J.W. Chung, J. Choi and D. Yang	309	A control-relevant model reduction technique for nonlinear systems
D.P. Coffey, B.E. Ydstie and C.A. Farschman	317	Distillation stability using passivity and thermodynamics
S.J. Honkomp, S. Lombardo, O. Rosen and J.F. Pekny	323	The curse of reality — why process scheduling optimization problems are difficult in practice
S. Bose and J.F. Pekny	329	A model predictive framework for planning and scheduling problems: a case study of consumer goods supply chain
I. Harjunkoski, V. Jain and I.E. Grossmann	337	Hybrid mixed-integer/constraint logic programming strategies for solving scheduling and combinatorial optimization problems
T. Nishi, A. Sakata, S. Hasebe and I. Hashimoto	345	Autonomous decentralized scheduling system for just-in-time production
L.A. Rodrigues, M. Graells, J. Cantón, L. Gimeno, M.T.M. Rodrigues, A. Espuña and L. Puigjaner	353	Utilization of processing time windows to enhance planning and scheduling in short term multipurpose batch plants
G. Sand, S. Engell, A. Märkert, R. Schultz and C. Schulz	361	Approximation of an ideal online scheduler for a multiproduct batch plant
C.A. Méndez and J. Cerdá	369	Optimal scheduling of a resource-constrained multiproduct batch plant supplying intermediates to nearby end-product facilities
W. Huang and P.W.H. Chung	377	Scheduling of pipeless batch plants using constraint satisfaction techniques
J. Kim and I. Moon	385	Synthesis of safe operating procedure for multi-purpose batch processes using SMV
K. Wang, T. Löhl, M. Stobbe and S. Engell	393	A genetic algorithm for online-scheduling of a multiproduct polymer batch plant
Y. Zhao, M.L. Lu and Y. Yuan	401	Operation and maintenance integration to improve safety
Y.M. Sebzalli, R.F. Li, F.Z. Chen and X.Z. Wang	409	Knowledge discovery from process operational data for assessment and monitoring of operator's performance
M. Shacham, N. Brauner and M.B. Cutlip	415	Open architecture modelling and simulation in process hazard assessment
W. Lin, Y. Qian and X. Li	423	Nonlinear dynamic principal component analysis for on-line process monitoring and diagnosis

R. Rengaswamy and V. Venkatasubramanian	431	A fast training neural network and its updation for incipient fault detection and diagnosis
Y. Huang, G.V. Reklaitis and V. Venkatasubramanian	439	Dynamic optimization based fault accommodation
S. Ungarala and B.R. Bakshi	445	A multiscale, Bayesian and error-in-variables approach for linear dynamic data rectification
K. Fukushima, R. Maeshima, A. Kinoshita, H. Shiraishi and I. Koshijima	453	Gas pipeline leak detection system using the online simulation method
Y. Qian, Q. Huang, W. Lin and X. Li	457	An object/agent based environment for the Computer Integrated Process Operation System
M.L. Lu, A. Yang, H. Li and T. Wada	463	Application driven approach for the development of a data model standard for process plant operation
Y. Yamashita	471	Supervised learning for the analysis of process operational data
G. Yi, K.-H. Suh, B. Lee and E.S. Lee	475	Optimal operation of quality controlled product storage
E.C.V. de Toledo, R.F. Martini and R.M. Filho	481	Development of high performance operational strategies for polymerization reactor
A.M. Strouvalis, I. Heckl, F. Friedler and A.C. Kokossis	487	Customized solvers for the operational planning and scheduling of utility systems
K. Naito, M. Nakaiwa, K. Huang, A. Endo, K. Aso, T. Nakanishi, T. Nakamura, H. Noda and T. Takamatsu	495	Operation of a bench-scale ideal heat integrated distillation column (HIDiC): an experimental study
V.P. Barbosa, Jr, M.R.M. Wolf and R. Maciel Fo	501	Development of data reconciliation for dynamic nonlinear system: application the polymerization reactor
T. Jiang, B. Chen and X. He	507	Industrial application of wavelet transform to the on-line prediction of side draw qualities of crude unit
M. Kim, Y.-H. Lee and C. Han	513	Real-time classification of petroleum products using near-infrared spectra
A. Aoyama, I. Yamadai, R. Batres and Y. Naka	519	Multi-dimensional object oriented approach for automatic generation of control recipes
A.C. Zanin, M. Tvrzská de Gouvêa and D. Odloak	525	Industrial implementation of a real-time optimization strategy for maximizing production of LPG in a FCC unit
R. Nath and Z. Alzein	533	On-line dynamic optimization of olefins plants
A. Yang and M.L. Lu	539	A formulation of the collaboration mechanism for integrated abnormal situation management
S. Viswanathan, N. Shah and V. Venkatasubramanian	545	A hybrid strategy for batch process hazards analysis
T. Kurooka, Y. Yamashita and H. Nishitani	551	Mind state estimation for operator support

H. Nishitani, T. Kawamura and G. Suzuki	557	University–industry cooperative study on plant operations
S. Skogestad	569	Self-optimizing control: the missing link between steady-state optimization and control
C. Antoniades and P.D. Christofides	577	Computation of optimal actuator locations for nonlinear controllers in transport-reaction processes
Y. Yabuki, T. Nagasawa and J.F. MacGregor	585	An industrial experience with product quality control in semi-batch processes
A.A. Linninger, S. Chowdhry, V. Bahl, H. Krendl and H. Pinger	591	A systems approach to mathematical modeling of industrial processes
B. Bayer, R. Schneider and W. Marquardt	599	Integration of data models for process design — first steps and experiences
D.R. Watson, D. Dzirbik, J. Rudolph and G.S. Joglekar	607	The integration of process simulation in operational analysis
G. Zhang, B. Hua and Q. Chen	613	Exergoeconomic methodology for analysis and optimization of process systems
K. Hou, Y. Li, J. Shen and S. Hu	619	Delayed sampling approach to stochastic programming in chemical processes
R. Williams, I. Cameron and K. Burrage	625	A new index 2 Runge–Kutta method for the simulation of batch and discontinuous processes
C.-Y. Gau and M.A. Stadtherr	631	Reliable nonlinear parameter estimation using interval analysis: error-in-variable approach
J.W. Lee and A.W. Westerberg	639	Visualization of stage calculations in ternary reacting mixtures
K. Takano, R. Gani, T. Ishikawa and P. Kolar	645	Computer aided design and analysis of separation processes with electrolyte systems
F. Bezzo, S. Macchietto and C.C. Pantelides	653	A general framework for the integration of computational fluid dynamics and process simulation
G. Blau, B. Mehta, S. Bose, J. Pekny and G. Sinclair	659	Risk management in the development of new products in highly regulated industries
Y. Naka, M. Hirao, Y. Shimizu, M. Muraki and Y. Kondo	665	Technological information infrastructure for product lifecycle engineering
S. Lakshminarayanan, H. Fujii, B. Grosman, E. Dassau and D.R. Lewin	671	New product design via analysis of historical databases
P.M. Harper and R. Gani	677	A multi-step and multi-level approach for computer aided molecular design
P. Ghosh, A. Sundaram, V. Venkatasubramanian and J.M. Caruthers	685	Integrated product engineering: a hybrid evolutionary framework
G.L. Moore, C.D. Maranas, K.R. Gutshall and J.E. Brenchley	693	Modeling and optimization of DNA recombination

S. Siddhaye, K.V. Camarda, E. Topp and M. Southard	701	Design of novel pharmaceutical products via combinatorial optimization
E.C. Marcoulaki, A.C. Kokossis and F.A. Batzias	705	Novel chemicals for clean and efficient processes using stochastic optimization
S. Lee, C. Phalakornkule, M.M. Domach and I.E. Grossmann	711	Recursive MILP model for finding all the alternate optima in LP models for metabolic networks
M.A. Steffens, E.S. Fraga and I.D.L. Bogle	717	Synthesis of purification tags for optimal downstream processing
A. Shindo, H. Yamazaki, A. Toki, R. Maeshima, I. Koshijima and T. Umeda	721	An approach to potential risk analysis of networked chemical plants
S. Young Eo, T. Suk Chang, D. Shin and E. Sup Yoon	729	Cooperative problem solving in diagnostic agents for chemical processes
M. Bhushan and R. Rengaswamy	735	Design of sensor location based on various fault diagnostic observability and reliability criteria
C.-S. Tsai, C.-T. Chang, S.-W. Yu and C.-S. Kao	743	Robust alarm generation strategy
K. Mingfang, C. Bingzhen and L. Bo	749	An Integral approach to dynamic data rectification
S.H. Fourie and P. de Vaal	755	Advanced process monitoring using an on-line non-linear multiscale principal component analysis methodology
Y. Tsuge, K. Hiratsuka, K. Takeda and H. Matsuyama	761	A fault detection and diagnosis for the continuous process with load-fluctuations using orthogonal wavelets
A. Bakhtazad, A. Palazoglu and J.A. Romagnoli	769	Detection and classification of abnormal process situations using multidimensional wavelet domain hidden Markov trees
D. Ruiz, J. María Nougués, Z. Calderón, A. Espuña and L. Puigjaner	777	Neural network based framework for fault diagnosis in batch chemical plants
S. Dash and V. Venkatasubramanian	785	Challenges in the industrial applications of fault diagnostic systems
L. Özkan, M.V. Kothare and C. Georgakis	793	Model predictive control of nonlinear systems using piecewise linear models
N.H. El-Farra and P.D. Christofides	801	Robust optimal control and estimation of constrained nonlinear processes
J.Y. Choi, J. Lee, J.H. Jung, M. Lee and C. Han	809	Sequential loop closing identification of multivariable process models
Y. Hashimoto, K. Matsumoto, T. Matsuo, T. Hamaguchi, A. Yoneya and Y. Togari	815	Anti-saturation discrete-time nonlinear controllers and observers
J. Choi, H.S. Ko and K.S. Lee	823	Constrained linear quadratic optimal control of chemical processes
P. Li, M. Wendt and G. Wozny	829	Robust model predictive control under chance constraints

P.R. Goulding, B. Lennox, Q. Chen and D.J. Sandoz	835	Robust inferential control using kernel density methods
J.B. Jørgensen and S.B. Jørgensen	841	Towards automatic decentralized control structure selection
J. Lee and T.F. Edgar	847	Computational method for decentralized integral controllability of low dimensional processes
F.G. Martins and M.A.N. Coelho	853	Application of feedforward artificial neural networks to improve process control of PID-based control algorithms
H. Shu and Y. Pi	859	PID neural networks for time-delay systems
S.M. Khuu, J.A. Rodriguez, J.A. Romagnoli and K.F. Ngian	863	Optimisation and control of an industrial surfactant reactor
S. Park and C. Han	871	A nonlinear soft sensor based on multivariate smoothing procedure for quality estimation in distillation columns
J.R. Phimister and W.D. Seider	879	Semicontinuous, middle-vessel, extractive distillation
T. Kurooka, Y. Yamashita, H. Nishitani, Y. Hashimoto, M. Yoshida and M. Numata	887	Dynamic simulation and nonlinear control system design of a heterogeneous azeotropic distillation column
I.-L. Chien, W.-H. Chen and T.-S. Chang	893	Operation and decoupling control of a heterogeneous azeotropic distillation column
M. Serra, M. Perrier, A. Espuna and L. Puigjaner	901	Study of the divided wall column controllability: influence of design and operation
M. Fikar, M.A. Latifi, J.P. Corriou and Y. Creff	909	CVP-based optimal control of an industrial depropanizer column
T. Hamamura, K.-I. Sotowa, S. Hasebe and I. Hashimoto	917	The effects of design variables on the stabilizing control of continuous DTB crystallizers
L.A.C. Meleiro and R. Maciel Filho	925	A self-tuning adaptive control applied to an industrial large scale ethanol production
Y. Kim, B. Lee, S. Eo and E.S. Yoon	931	A study on the evaluation and improvement of structural controllability of chemical processes
L. Ender and R. Maciel Filho	937	Design of multivariable controller based on neural networks
C. Sato, T. Ohtani and H. Nishitani	945	Modeling, simulation and nonlinear control of a gas-phase polymerization process
D.C. Chae, I. Chin, K.S. Lee, H. Rho, H. Rhee and J.H. Lee	953	Integrated quality and tracking control of a batch PMMA reactor using a QBMPC technique
A.W. Westerberg and E. Subrahmanian	959	Product design
B.M. Russel, J.P. Henriksen, S.B. Jørgensen and R. Gani	967	Integration of design and control through model analysis

A. Cruse, W. Marquardt, R.J. Allgor and J. Kussi	975	Integrated conceptual design of stirred tank reactors by periodic dynamic optimization
A. Cervantes, S. Tonelli, A. Brandolin, A. Bandoni and L. Biegler	983	Large-scale dynamic optimization of a low density polyethylene plant
M.J. Realff, J.C. Ammons and D. Newton	991	Strategic design of reverse production systems
Y. Shimizu and Y. Sahara	997	A supporting system for evaluation and review of business process through activity-based approach
D. Subramanian, J.F. Pekny and G.V. Reklaitis	1005	A simulation–optimization framework for addressing combinatorial and stochastic aspects of an R&D pipeline management problem
M. Bassett	1013	Assigning projects to optimize the utilization of employees' time and expertise
C.-W. Hui	1023	Determining marginal values of intermediate materials and utilities using a site model
I. Dióspatonyi, Z. Syposs, Z. Viczián, G. Kollár and M. Láng-Lázi	1031	Quality assurance aspects in biochemical and chemical information technology
H. Yoon, H. Lee and I. Moon	1037	Quantitative business decision-making for the investment of preventing safety accidents in chemical plants
A.A. Linninger, A. Chakraborty and R.D. Colberg	1043	Planning of waste reduction strategies under uncertainty
S.A. van den Heever, I.E. Grossmann, S. Vasantharajan and K. Edwards	1049	Integrating complex economic objectives with the design and planning of offshore oilfield infrastructures
I.T. Cameron	1057	An interactive web-based decision support system for hazardous industry land-use planning
A. Romanenko and J.A.A.M. Castro	1063	An RT-Linux based control system of a pilot plant for reaction kinetics and process control studies
N. Aziz, M.A. Hussain and I.M. Mujtaba	1069	Performance of different types of controllers in tracking optimal temperature profiles in batch reactors
Y.-H. Chen and C.-C. Yu	1077	Interaction between thermal efficiency and dynamic controllability for heat-integrated reactors
P. Sarma and R. Rengaswamy	1083	Multivariable gain-scheduled fuzzy logic control of a fluidized catalytic cracker unit
M.R. Eden, A. Koggersbøl, L. Hallager and S.B. Jørgensen	1091	Dynamics and control during startup of heat integrated distillation column
A. José de Assis and R. Maciel Filho	1099	Soft sensors development for on-line bioreactor state estimation
K. Zuo and W.T. Wu	1105	Semi-realtime optimization and control of a fed-batch fermentation system

A. Mattedi and R. Maciel Filho	1111	Development of switched predictive control system for continuous purification process of bioproducts
K.-U. Klatt, F. Hanisch, G. Dünnebier and S. Engell	1119	Model-based optimization and control of chromatographic processes
S. Natarajan and J.H. Lee	1127	Repetitive model predictive control applied to a simulated moving bed chromatography system
R. García-Flores, X.Z. Wang and G.E. Goltz	1135	Agent-based information flow for process industries' supply chain modelling
E. Perea, I. Grossmann, E. Ydstie and T. Tahmassebi	1143	Dynamic modeling and classical control theory for supply chain management
Z. Zhou, S. Cheng and B. Hua	1151	Supply chain optimization of continuous process industries with sustainability considerations
J.G. Rickard, M. Celeste Colantonio, S. Macchietto and N. Shah	1159	Integration in hierarchical structures for batch process operations
E. Chekhova, P.I. Barton and A. Gorak	1167	Optimal operation processes of discrete-continuous biochemical processes
J. Schumacher	1175	A framework for batch-operation analysis within the context of disturbance management
G. Dolph	1181	The use of dynamic simulation to develop control strategies for emergency situations
E.C. Martinez	1187	Batch process modeling for optimization using reinforcement learning
B. Alexander, G. Barton, J. Petrie and J. Romagnoli	1195	Process synthesis and optimisation tools for environmental design: methodology and structure
T. Binder, A. Cruse, C.A. Cruz Villar and W. Marquardt	1201	Dynamic optimization using a wavelet based adaptive control vector parameterization strategy
D.C. Miller and P. Huo	1209	A process alternative generator for process chemistry development
M. Li, S. Hu, Y. Li and J. Shen	1215	Reaction path synthesis for a mass closed-cycle system
Z.H. Li and B. Hua	1223	Modeling and optimizing for heat exchanger networks synthesis based on expert system and exergo–economic objective function
A. Kovač Kralj and P. Glavič	1229	Simultaneous retrofit of complex and energy intensive processes-III
M. Bagajewicz and H. Rodera	1237	Energy savings in the total site: Heat integration across many plants
Y. Wang and X. Feng	1243	Exergy analysis involving resource utilization and environmental influence

L.M.F. Lona, F.A.N. Fernandes, M.C. Roque and S. Rodrigues	1247	Developing an educational software for heat exchangers and heat exchanger networks projects
S. Sundquist, J. Ilme, L. Määttä and I. Turunen	1253	Using models in different stages of process life-cycle
S.P. Asprey and S. Macchietto	1261	Statistical tools for optimal dynamic model building
Y. Xin, V.R. Vasquez and W.B. Whiting	1269	Effect of regression approach in the estimation of nonlinear model parameters on process design and simulation: applications to kinetic and thermodynamic models
D. Glasser, D. Hildebrandt and B. Hausberger	1275	'Costing' distillation systems from residue curve based designs
T.C. Lee, K.S. Lee, T.-W. Yoon and D.R. Yang	1281	A composition estimator for multicomponent flash drum using recursive equation error method
H. Briesen and W. Marquardt	1287	Adaptive model reduction and simulation of thermal cracking of multicomponent hydrocarbon mixtures
S.S.E.H. Elnashaie, T. Moustafa, T. Alsoudani and S.S. Elshishini	1293	Modeling and basic characteristics of novel integrated dehydrogenation–hydrogenation membrane catalytic reactors
S. Espinosa, S. Diaz and E.A. Brignole	1301	Optimal design of supercritical fluid processes
C.B. Batistella, M.R.W. Maciel and R. Maciel Filho	1309	Rigorous modeling and simulation of molecular distillators: development of a simulator under conditions of non ideality of the vapor phase
E. Lu, H. Zhang and X. Zhu	1317	A novel design for vapor recovery units
Y. Wang, H. Teng, P. Yao, X. Qian, M. Li and Y. Jin	1323	Reliability design of operating procedures for dehydrator regeneration
Z. Lelkes, Z. Szitkai, E. Rev and Z. Fonyo	1331	Rigorous MINLP model for ethanol dehydration system
B. Wang, X. Ma, G. Xu and L. Mao	1337	Optimization of cyclical process for CO coupling regeneration reactions
K. Hou, Q. Zheng, Y. Li, J. Shen and S. Hu	1343	Modeling and optimization of herb leaching processes
M.C. Roque and L.M.F. Lona	1349	The economics of the detailed design of heat exchanger networks using the Bell Delaware method
L.F.M. Zorzetto, R. Maciel Filho and M.R. Wolf-Maciel	1355	Process modelling development through artificial neural networks and hybrid models
P. Kesavan and P.I. Barton	1361	Generalized branch-and-cut framework for mixed-integer nonlinear optimization problems
J. Perkins	1367	Education in process systems engineering: Past, present and future
D.R. Lewin, W.D. Seider and J.D. Seader	1369	An integrated approach to process design instruction

J.F. Brennecke and M.A. Stadtherr	1375	A course in environmentally conscious chemical process design
D. Shin, E.S. Yoon, S.J. Park and E.S. Lee	1381	Web-based interactive virtual laboratory system for unit operations and process systems engineering education
A. Koulouris, J. Calandranis and D.P. Petrides	1387	Throughput analysis and debottlenecking of integrated batch chemical processes
A. Faanes and S. Skogestad	1395	A systematic approach to the design of buffer tanks
B. Pahor, N. Irsic and Z. Kravanja	1403	MINLP synthesis and modified attainable region analysis of reactor networks in overall process schemes using more compact reactor superstructure
Y. Yang and L. Shi	1409	Integrating environmental impact minimization into conceptual chemical process design — a process systems engineering review
N.L. Book and V.U.B. Challagulla	1421	Inherently safer analysis of the attainable region process for the adiabatic oxidation of sulfur dioxide
P. Lang, G. Modla, B. Kotai, Z. Lelkes and P. Moszkowicz	1429	Homoazeotropic distillation of maximum azeotropes in a batch rectifier with continuous entrainer feeding: Rigorous simulation results
Y. Zhao-Ling and Y. Xi-Gang	1437	An approach to optimal design of batch processes with waste minimization
M.B. Noureldin and M.M. El-Halwagi	1445	Pollution prevention targets through integrated design and operation
D. Xue, S. Li, Y. Yuan and P. Yao	1455	Synthesis of waste interception and allocation networks using genetic-alopex algorithm
M.J. Bagajewicz, M. Rivas and M.J. Savelski	1461	A robust method to obtain optimal and sub-optimal design and retrofit solutions of water utilization systems with multiple contaminants in process plants
M.P.C. Weijnen and P.M. Herder	1467	Process systems knowledge sharing between higher education and industrial practice
M. Realff, P. Ludovice, M. Guzdial, T. Morley and K. Sukel	1473	Computer supported collaborative learning for curriculum integration
D. Mahoney, B. Young and W. Svrcek	1481	A completelv real time approach to process control education for process systems engineering students and practitioners
M. Hough and T. Marlin	1485	Web-based Interactive Learning Modules for Process Control
A.M. Frattini Fileti and J.A.F. Rocha Pereira	1491	A direct digital control experiment for graduate and undergraduate chemical engineering students
J.H. Jung, M. Lee, J. Lee and C. Han	1497	A development of experimental education program: computer control of multi-stage level control system

E.P. Gatzke, E.S. Meadows, C. Wang and F.J. Doyle III	1503	Model based control of a four-tank system
S. Bose and G.E. Blau	1511	Use of a network model interface to build spreadsheet models of process systems: a productivity enhancement tool for risk management studies
S. Lee, I. Jeong and I. Moon	1517	Development of evaluation algorithms for operator training system
E. Joo, K. Lee, M. Lee and S. Park	1523	CRACKER — a PC based simulator for industrial cracking furnaces
J. Zhao, S. Viswanathan, C. Zhao, F. Mu and V. Venkatasubramanian	1529	Computer-integrated tools for batch process development
K.D. Schnelle	1535	Preliminary design and scheduling of a batch agrochemical plant
N. Zhang and X.X. Zhu	1543	A novel modelling and decomposition strategy for overall refinery optimisation
Y.-D. Lang, L.T. Biegler, E.E. Maier and R.A. Majewski	1549	An optimal catalyst management strategy for Oxo processes
Y. Wang, H. Seki, S. Ohyama, K. Akamatsu, M. Ogawa and M. Ohshima	1555	Optimal grade transition control for polymerization reactors
S. Subramanian and C. Georgakis	1563	Steady-state operability characteristics of reactors
G. Fernholz, S. Engell, L.-U. Kreul and A. Gorak	1569	Optimal operation of a semi-batch reactive distillation column
M. Noda, T. Chida, S. Hasebe and I. Hashimoto	1577	On-line optimization system of pilot scale multi-effect batch distillation system
K. Wu, X. He and B. Chen	1585	On-line training method of ANN in DMS for side draw quality of refinery fractionator
J.H. Lee and J. Xiao	1591	Use of two-stage optimization in model predictive control of stable and integrating systems
H.-K. Lee, I.-B. Lee and G.V. Reklaitis	1597	Capacity expansion problem of multisite batch plants with production and distribution
S.B. Kim, H.-K. Lee, I.-B. Lee, E.S. Lee and B. Lee	1603	Scheduling of non-sequential multipurpose batch processes under finite intermediate storage policy
C.-W. Hui and A. Gupta	1611	A novel MILP formulation for short-term scheduling of multistage multi-product batch plants
K. Takeda, Y. Tsuge and H. Matsuyama	1619	Decentralized scheduling algorithm to improve the rate of production without increase of stocks of intermediates
B.P. Das, J.G. Rickard, N. Shah and S. Macchietto	1625	An investigation on integration of aggregate production planning, master production scheduling and short-term production scheduling of batch process operations through a common data model

J.-K. Ha, H.-K. Chang, E.S. Lee, I.-B. Lee, B.S. Lee and G. Yi	1633	Intermediate storage tank operation strategies in the production scheduling of multi-product batch processes
N.L. Book and V. Bhatnagar	1641	Information models for planning and scheduling of chemical processes
D. Geddes and T. Kubera	1645	Integration of planning and real-time optimization in olefins production
S. Bose, D. Subramanian, S. Orcun and J.F. Pekny	1651	ePIMA: an electronic environment for process investigation and management analysis
E.C. Martinez	1657	Systems thinking and functional modeling of batch process management using projects
P. Lang, G. Modla, B. Benadda and Z. Lelkes	1665	Homoazeotropic distillation of maximum azeotropes in a batch rectifier with continuous entrainer feeding I. Feasibility studies
S.-y. Han, Y.-s. Kim, T.-y. Lee and T.S. Yoon	1673	A framework of concurrent process engineering with agent-based collaborative design strategies and its application on plant layout problem
I.-S. Han, C.-B. Chung and J. B. Riggs	1681	Modeling of a fluidized catalytic cracking process
R.T.P. Pinto, M.R. Wolf-Maciel and L. Lintomen	1689	Saline extractive distillation process for ethanol purification
F.P. Bernardo, P. Saraiva and E.N. Pistikopoulos	1695	Inclusion of information costs in process design optimization under uncertainty
H. Yamaba and S. Tomita	1703	Design of flexible production system by means of tax-system-like algorithm (TA)
U. Gollapalli, M.M. Dantus and K.A. High	1709	Environment and control issues in design
G. Maria, C. Maria, R. Salcedo and S.F. de Azevedo	1713	Databank transfer-of-information, shortcut and exact estimators used in the wastewater biological treatment process identification
G. C.A., R. P.R., M. M. and P. L.F.	1719	Simulation of an industrial wastewater treatment plant using artificial neural networks
I.S.F. Freitas, C.A.V. Costa and R.A.R. Boaventura	1725	Conceptual design of industrial wastewater treatment processes: primary treatment
R.M. Cotta, M.R. Wolf-Maciel and R. Maciel Filho	1731	A cape of HDT industrial reactor for middle distillates
J.L. Klepeis and C.A. Floudas	1737	Deterministic global optimization and torsion angle dynamics for molecular structure prediction
J.F. Kikstra and A.H.M. Verkooijen	1745	Dynamic modeling for an optimal design of a cogenerating nuclear gas turbine plant
S.M.C.P. Pedrosa and J.R. Nunhez	1753	The behavior of stirred vessels with anchor type impellers

J.A. Morón-Villarreyes, H.J.B. da Costa, F. Kokubun, L.C. Schmitz and J.A. Castro	1759	Some applications of salt-water oscillator in chemical engineering teaching and process equipment design
J.F. Pekny	1761	Process systems engineering in an electronic economy: expanding applications and the changing relationship between research and practice
B.R. Bakshi	1767	A thermodynamic framework for ecologically conscious process systems engineering
P.M. Herder, A.L. Turk, E. Subrahmanian and A.W. Westerberg	1775	Challenges for process systems engineering in infrastructure design

NUMBER 8

R. Jacobs and W. Jansweijer	1781	A knowledge-based system for reactor selection
R. Jacobs and W. Jansweijer	1803	A knowledge-based method for the automatic derivation of reactor strategies
W.C. Kim, I.S. Chin, K.S. Lee and J. Choi	1815	Analysis and reduced-order design of quadratic criterion-based iterative learning control using singular value decomposition
J.L. Figueroa	1821	Economic performance of variable structure control: a case study
Y. Zhang and J. Fraser Forbes	1829	Extended design cost: a performance criterion for real-time optimization systems
L. Yang and K.T. Chuang	1843	A new approach to simulation of distillation in packed columns
R.W. Maier, J.F. Brennecke and M.A. Stadtherr	1851	Reliable computation of reactive azeotropes
M.H. Brendel, F. Friedler and L.T. Fan	1859	Combinatorial foundation for logical formulation in process network synthesis
J.A. Scott	1865	Row ordering for frontal solvers in chemical process engineering
Z. Kovács, Z. Ercsey, F. Friedler and L.T. Fan	1881	Separation-network synthesis: global optimum through rigorous super-structure
V.K. Jayaraman, B.D. Kulkarni, S. Karale and P. Shelokar	1901	Ant colony framework for optimal design and scheduling of batch plants
F. Akbaryan and P.R. Bishnoi	1913	Smooth representation of trends by a wavelet-based technique
M. Bagajewicz and M. Sánchez	1945	Reallocation and upgrade of instrumentation in process plants

S. Potaraju, B. Joseph, B. Khomami and J.L. Kardos 1961 A flexible approach to modeling and simulation of polymeric composite materials processing using object oriented techniques

F. Liu, S.K. Bhatia and I.I. Abarzhi 1981 Numerical solution of hyperbolic models of transport in bidisperse solids

F. Jalali-Farahani and J.D. Seader 1997 Use of homotopy-continuation method in stability analysis of multiphase, reacting systems

F.D. Vargas-Villamil and D.E. Rivera 2009 Multilayer optimization and scheduling using model predictive control: application to reentrant semiconductor manufacturing lines

H. Yu, H. Fang, P. Yao and Y. Yuan 2023 A combined genetic algorithm/simulated annealing algorithm for large scale system energy integration

Letter to the Editor

G.B. Ferraris 2037 Statistical tests and confidence intervals

NUMBERS 9–10

Special Issue on PanAmerican Collaboration for Computers and Chemical Engineering, edited by Ignacio E. Grossmann and Jaime Cerda

J. Cerdá and I.E. Grossmann 2041 Foreword

A.W. Westerberg, J.W. Lee and S. Hauan 2043 Synthesis of distillation-based processes for non-ideal mixtures

W.C. Rooney and L.T. Biegler 2055 Multiperiod reactor network synthesis

S. Diaz, H. Gros and E.A. Brignole 2069 Thermodynamic modeling, synthesis and optimization of extraction — dehydration processes

M.D. Shelley and M.M. El-Halwagi 2081 Component-less design of recovery and allocation systems: a functionality-based clustering approach

M. Bagajewicz 2093 A review of recent design procedures for water networks in refineries and process plants

A.M. Eliceche, A.I. Alonso and I. Ortiz 2115 Optimal operation of selective membrane separation processes for wastewater treatment

S. Lee and I.E. Grossmann 2125 New algorithms for nonlinear generalized disjunctive programming

A. Vecchietti and I.E. Grossmann 2143 Modeling issues and implementation of language for disjunctive programming

N.V. Sahinidis and M. Tawarmalani 2157 Applications of global optimization to process and molecular design

P.I. Barton, J.R. Banga and S. Galán 2171 Optimization of hybrid discrete/continuous dynamic systems

E.C. Biscaia, Jr. and R.C. Vieira 2183 Heuristic optimization for consistent initialization of DAEs

C.G. Raspanti, J.A. Bandoni and L.T. Biegler	2193	New strategies for flexibility analysis and design under uncertainty
G.E. Applequist, J.F. Pekny and G.V. Reklaitis	2211	Risk and uncertainty in managing chemical manufacturing supply chains
C.A. Méndez, G.P. Henning and J. Cerdá	2223	Optimal scheduling of batch plants satisfying multiple product orders with different due-dates
M.T.M. Rodrigues, L.G. Latre and L.C.A. Rodrigues	2247	Short-term planning and scheduling in multipurpose batch chemical plants: a multi-level approach
J.M. Pinto, M. Joly and L.F.L. Moro	2259	Planning and scheduling models for refinery operations
J.A. Asenjo, J.M. Montagna, A.R. Vecchietti, O.A. Iribarren and J.M. Pinto	2277	Strategies for the simultaneous optimization of the structure and the process variables of a protein production plant
V. Venkatasubramanian, J. Zhao and S. Viswanathan	2291	Intelligent systems for HAZOP analysis of complex process plants
C.A.O. Nascimento, R. Giudici and R. Guardani	2303	Neural network based approach for optimization of industrial chemical processes
G.P. Henning and J. Cerdá	2315	Knowledge-based predictive and reactive scheduling in industrial environments
M.E. Lienqueo and J.A. Asenjo	2339	Use of expert systems for the synthesis of downstream protein processes

NUMBER 11

A.M. Gibon-Fargeot, F. Celle-Couenne and H. Hammouri	2355	Cascade estimation design for CSTR models
M.J. Bagajewicz and Q. Jiang	2367	Comparison of steady state and integral dynamic data reconciliation
M.L. Bell and R.W.H. Sargent	2385	Optimal control of inequality constrained DAE systems
V.R. Subramanian and R.E. White	2405	Symbolic solutions for boundary value problems using Maple
R. Rico-Martínez, R.A. Adomaitis and I.G. Kevrekidis	2417	Noninvertibility in neural networks
A.R. Ciric, H.S. Mumtaz, G. Corbett, M. Reagan, W.D. Seider, L.A. Fabiano, D.M. Kolesar and S. Widagdo	2435	Azeotropic distillation with an internal decanter
J. Bausa and W. Marquardt	2447	Quick and reliable phase stability test in VLLE flash calculations by homotopy continuation
F. Chen, R.S. Huss, M.F. Malone and M.F. Doherty	2457	Simulation of kinetic effects in reactive distillation

D. Leung and J. Romagnoli	2473	Dynamic probabilistic model-based expert system for fault diagnosis
R. Rajasree and A.S. Moharir	2493	Simulation based synthesis, design and optimization of pressure swing adsorption (PSA) processes
K.R. Muske, J.W. Howse, G.A. Hansen and D.J. Cagliostro	2507	Model-based control of a thermal regenerator. Part 2: control and estimation
K.R. Muske, J.W. Howse, G.A. Hansen and D.J. Cagliostro	2519	Model-based control of a thermal regenerator. Part 1: dynamic model
S. Ralhan and T.A. Badgwell	2533	Robust control of stable linear systems with continuous uncertainty
A. Tholudur, W.F. Ramirez and J.D. McMillan	2545	Interpolated parameter functions for neural network models

NUMBER 12

A. Lucia, L. Padmanabhan and S. Venkataraman	2557	Multiphase equilibrium flash calculations
L. Lefèvre, D. Dochain, S. Feyo de Azevedo and A. Magnus	2571	Optimal selection of orthogonal polynomials applied to the integration of chemical reactor equations by collocation methods
A. Kassidas, J. Patry and T. Marlin	2589	Integrating process and controller models for the design of self-optimizing control
N. Brauner and M. Shacham	2603	Considering precision of data in reduction of dimensionality and PCA
A. Gupta, C.D. Maranas and C.M. McDonald	2613	Mid-term supply chain planning under demand uncertainty: customer demand satisfaction and inventory management
F. Aubé and H. Sapoundjiev	2623	Mathematical model and numerical simulations of catalytic flow reversal reactors for industrial applications
G.G. Botte, J.A. Ritter and R.E. White	2633	Comparison of finite difference and control volume methods for solving differential equations
R. Pörn and T. Westerlund	2655	A cutting plane method for minimizing pseudo-convex functions in the mixed integer case
M.A. Rodríguez-Toral, W. Morton and D.R. Mitchell	2667	Using new packages for modelling, equation oriented simulation and optimization of a cogeneration plant
A. Adrover, G. Continillo, S. Crescitelli, M. Giona and L. Russo	2687	Wavelet-like collocation method for finite-dimensional reduction of distributed systems
C.-W. Hui, A. Gupta and H.A.J. van der Meulen	2705	A novel MILP formulation for short-term scheduling of multi-stage multi-product batch plants with sequence-dependent constraints

R. Qi and M.A. Henson 2719 Membrane system design for multicomponent gas mixtures via mixed-integer nonlinear programming

S. Ungarala and T.B. Co 2739 Time-varying system identification using modulating functions and spline models with application to bio-processes

S. Devanathan, D.K. Rollins and S.B. Vardeman 2755 A new approach for improved identification of measurement bias

W. Zhang and X. Xu 2765 On the model reference method for unstable time delay systems

M. Chidambaram 2767 Reply to the comments of Zhang and Xu on the paper 'Design of controllers for unstable first-order plus time delay systems', Computers and Chemical Engineering V20, No 5, 579–584 (1996)

2771 List of contents (Volume 24)
2789 Author index for Volume 24
2793 Announcement